

Based Upon: PCT/EP2004/000014


REMARKS

Applicant respectfully requests entry of the above Preliminary Amendment to place this Patent Application in better form for examination and prosecution before the U.S. Patent and Trademark Office.

The claims have been amended to eliminate multiple dependent claims and to more definitely and fully claim the subject matter of Applicant's invention. Applicant urges that the above Preliminary Amendment introduces no new matter into this Patent Application.

Applicant sincerely believes that this Patent Application is now in condition for examination and prosecution before the U.S. Patent and Trademark Office.

Respectfully submitted,



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BUSBAR SYSTEM AND CONNECTING OR APPLIANCE ADAPTER

BACKGROUND OF THE INVENTION
Field of the Invention

[The] ^{This} invention relates to a busbar system, having a mounting unit for receiving several busbars in electrically insulating busbar holders, and at least one connecting or device adapter, which has a receiving bridge for receiving terminals or devices, and [is embodied for] has the electrical connection of the same with the busbars, and relates as well to a device adapter for use in such a busbar system.

[Such a] ^A busbar system, or such a device adapter, [has been made known by] ^{Discussion of Related Art} EP 0 926 790 A3, for example. Hook elements of this known busbar system and device adapter which, for producing a dependable mechanical and electrical connection, have spring-loaded elements, and which can be suspended from the respective busbars, are arranged on (the) ^{is taught by European Patent Reference} an underside of the adapter facing the busbar. A relatively elaborate ^{cost} outlay is connected with this, and the manipulation of the device adapters during attaching and releasing them can ^{cause} be connected with difficulties, [in particular] ^{particularly} if the device adapters [are equipped with] ^{have} devices connected to them.

[Further such] ^{Other} device adapters are [shown in] ^{taught by European Patent Reference} EP 0 926 791 A3 and DE 93 06 013 U1. ^{German Patent Reference}

^{One} [The] object of (the) ^{SUMMARY OF THE INVENTION} invention is [based on making available] a busbar system, as well as a device adapter, of the type mentioned ^{to provide} [at the outset, the result of] which ^{above but} is a simplified construction and simpler handling.

This object is [attained by means of the] ^{achieved with a} busbar system having [the characteristics] of claim 1. In accordance with this it is provided that the ^a mounting unit ^{with} has holding segments

along lateral longitudinal edge sections, which extend parallel with each other, ^{and that on its}. On two oppositely located end sections the at least one adapter ^{has} is provided with a first and a second fastening section, which are matched to the edge sections to which they are or can be assigned, and ^{have} are provided with holding elements which work together with the holding segments for fixing the adapter in place.

^{with} By means of these measures, the mechanical fastening of the adapter at the mounting unit and its electrical connection to the busbars are separated from each other, wherein the mechanical connection, as well as the electrical connection, are better functionally matched to the respective requirements, and the construction and manipulations are ^{simplified} made easier. In this case stable mounting is also assured because of the mechanical fastening at the two end sections.

In connection with the device adapter ^{in accordance with claim 9} for use in a busbar system ^{in accordance with claim 1}, having a receiving bridge, on whose top facing away from the busbar to be contacted, devices to be electrically connected with the busbars can be arranged, and on whose underside contact elements for providing an electrical contact with associated busbars are arranged, ^A it has been further provided for attaining the object, that a first and a second fastening section, which ^{have} are provided with holding elements for securing the adapter on a mounting unit outside of the area of contact sections of the contact elements, are embodied on the underside of the two narrow end elements of the adapter.

These steps also result in a separation of the mechanical fastening and the electrical connection, as well as the above mentioned advantages in construction and manipulation.

In one ^{it is advantageous for} [An] embodiment [advantageous] for the construction and manipulation [consists] in that] the edge sections ^{to} have strips, which protrude from a mounting plane and on whose protruding end sections the holding segments ^{are} [have been] formed.

[Furthermore] ^{Also} the steps wherein the holding segments are embodied as laterally outwardly angled holding structures and/or have rows of fastening receivers, [contribute to] ^{form} a stable, simple attachment and release of the device adapter.

[Moreover] ^{Also} the steps, wherein the mounting unit is embodied in cross section [as] is a shallow U-shaped trough with a base section, on which the lateral edge sections [have been] ^{are} formed and angled off, or attached as separate angular profiled sections, [and that the] ^{The} busbars can be fixed in place in the trough by [means of] busbar holders, which are arranged transversely with [in] respect to the mounting unit, ^{and} contribute to an advantageous construction and simple, flexible mounting.

^{advantageous because} The construction and manipulation of the device adapter are [favorable affected] in that] a first one of ^{the} holding elements is embodied as a hook element, which can be adjusted against an opposing spring force for releasing the adapter, [and] ^A a second one of the holding elements is embodied as a hook element, which is fixedly connected with the associate fastening section.

For a dependable electrical connection, along with a simple operation, [it has] been advantageously provided that] several contact elements, which extend in the longitudinal direction of the adapter, are seated in the underside of the insulating receiving bridge which faces the mounting unit, and by [means of] which an electrical contact with the associated busbars is provided [on the one hand] and [on the other hand] a connection with a connection

section, which ^{is} ~~has been~~ formed in at least one end section of the adapter, is made. ~~[In this case]~~ ^{Thus} a dependable electrical contact is aided ~~[in that]~~ ^{because} the contact elements are ~~[embodied to be]~~ springy and/or are charged with a spring force ~~[in such a way]~~ ^{so} that a contact pressure is created with a contact section of the contact elements on the outside of the associated busbars facing away from the mounting unit.

A simple rugged attachment of devices is ~~[made]~~ possible ~~[in that]~~ ^{because a} coupling ~~[means]~~ ^{device} for attaching devices to be received ~~[are]~~ ^{is} provided on the top of the receiving bridge facing away from the mounting unit, which can be electrically connected by ~~[means of]~~ connecting lines via connecting receivers in the top of the end section of the adapter.

~~(An advantageous)~~ ^{In one} embodiment for the manipulation and construction of the adapter, ~~[consists in that]~~ the holding elements are embodied as hook elements, at least one of which is adjustably seated.

^{There is} ~~(An)~~ improved protection against accidental contact of the user ~~[also results from]~~ ^{with a} the simplified construction and simplified manipulation, because the device adapters, possibly also with the devices connected with them, can be mounted and released in a simple and unequivocal manner. It is also possible ~~[in a simple way]~~ ^{simply} to attach covers for the busbars at the holding segments of the mounting unit between the device adapters, wherein the covers ~~[are]~~ ^{have} provided with holding elements which correspond to those of the adapters.

^{BRIEF DESCRIPTION OF THE DRAWINGS}
~~[In what follows, the]~~ ^{This} invention ~~[will be]~~ ^{is} explained ~~[by means]~~ ^{in view} of exemplary embodiments, making reference to the drawings. ~~[Shown are in:]~~ ^{attached}

Fig. 1 ^{is} a lateral view of a mounting unit with busbars ~~[attached thereto]~~ ^{attached} and a device adapter to be placed on it;

- Fig. 2^{shows} a representation of the parts^{shown} in Fig. 1 with the device adapter attached[;];
 Fig. 3^{shows} a perspective plan view of the busbar system in Fig. 2[;];
 Fig. 4^{shows} a perspective view of a device adapter with devices to be attached^[via] by a
 coupling^{element} means in a released arrangement[;] and
 Fig. 5^{shows} a perspective view of the components^{shown} in Fig. 4 in^{an} the assembled form.

DESCRIPTION OF PREFERRED EMBODIMENTS

An exemplary embodiment of a busbar system represented in Fig. 1 shows a mounting unit 2, on which several busbars 4 are arranged by means of busbar holders 3 attached thereto, and with which a device adapter 1, which is brought into contact with the busbars 4, is connected. The attached state of the adapter 1^{is shown} can be seen in Figs. 2 and 3.

The mounting unit 2 has two lateral profiled sections in the shape of edge sections 2.2, 2.3, which are angled away in a Z- shape, wherein^a the center section of the edge sections 2.2, 2.3 projects away vertically out of a mounting plane^{The} and the two end sections are oriented parallel with the mounting plane and are^{thus} at right angles^{with} in respect to the center section. The end sections of the first and second edge sections 2.2, 2.3 facing the mounting plane face each other, while the end sections facing away from the mounting plane are embodied as the first and second holding section 2.21, 2.31 and point outward away from each other. In addition, for improving the holding effect, the two holding segments 2.21, 2.31 have short holding protrusions, which are oriented downward toward the mounting plane. (In addition and as^{As} represented in Fig. 3, it is possible to provide holding receivers 2.22 in the holding sections 2.2, 2.3, which advantageously also can have a customary grid spacing.

For forming the mounting unit 2, the profiled edge sections 2.2, 2.3 can be applied directly to a mounting plane, in particular a mounting board or, as^{shown} can be seen in Figs.

2 and 3, they can be connected with each other by ^(means of) their own, preferably plate-like base sections 2.1. In this case the edge sections 2.2, 2.3 can be attached as separate elements to the base section 2.1, or can be formed as one piece on ^{the base section 2.1} it. If an insulation of the mounting unit 2 is desired, the base section 2.1 and/or the edge sections 2.2, 2.3 can be made of an insulating material or coated with an insulating layer. In cross section, the mounting unit 2 is embodied as a shallow U-shaped through, ^{for example} i.e. its width is greater by a multiple, for example more than three times or four times, its height.

The busbar holders 3 are attached in the mounting plane 2 between the center sections of the edge sections 2.2, 2.3 transversely to the longitudinal extension of the mounting unit 2 and are attached, for example, to the base section 2.1 and/or the center section of the edge sections 2.2, 2.3 by ^{an} appropriate ^{fastener} fastening means. The busbars 4 are seated on the top of the busbar holders facing away from the base section 2.1, ^{namely} in a lower section 3.1 of the same, and are rigidly fixed in place by a top section 3.2, which is screwed or snapped on.

The adapter 1, also represented in Figs. 4 and 5, which is substantially rectangular in a view from above, has lateral fastening sections 1.2, 1.3 with hook-like holding elements 1.21, 1.31 arranged on ^{an} (the) underside, in the area of ^{or near} its narrow end sections of both its sides. Connecting receivers 1.7 for the electrical connection with devices 8 to be received are provided in upwardly pointing protrusions on the top of the fastening sections 1.2, 1.3, which are attached to a receiving bridge 1.1 connecting the two end sections, by connecting means, for example a plate-like coupling element 6 and/or top hat rail-like coupling elements 7, as ^{shown} can be seen in Figs. 4 and 5. The electrical connection of the devices 8 with electrical contacts in the connecting receivers 1.7 is provided via connecting lines 5.

For connecting the adapter 1 mechanically with the mounting unit 2, the hook-shaped holding elements 1.21, 1.31 are suspended from the associated holding segments 2.21, 2.31 of the mounting unit 1, as ^{shown} can be seen in Fig. 2 in particular. For this purpose the ^{The} holding elements 1.21, 1.31 of the adapter have holding protrusions, which are facing each other at the distance of the holding segments 2.21, 2.31 and which, in the mounted state of the adapter 1, extend behind the holding segments 2.21, 2.31, wherein a defined holding tension is formed. Fixation in place of the adapter 1 takes place by a sort of snap-on process, for which purpose the first hook-shaped holding element 1.21 is pivotably or shiftably seated and is under the pre-tension of a spring ^{Thus} so that the hook element can be outwardly deflected against the spring force and is maintained in the holding position by means of the spring force. The second holding element 1.31 is fixedly connected with the end section, or the fastening section 1.3, preferably formed on it. ^{Thus} With these measures the second holding element 1.31 of the adapter 1 can first be suspended in a simple way from the corresponding holding section 2.31, and can thereafter be fixed in place on the first holding section 1.21 by the first holding element 1.21 snapping-in with a sort of pivot movement, wherein the first holding element 1.21 is deflected outward via an inclined run-up element arranged on ^{the first holding element 1.21} it. For releasing, the first holding element 1.21 can be moved outward manually against the spring force in a simple manner.

Alternatively to the described and represented embodiment of the fastening sections 1.2, 1.3 with the holding elements 1.21, 1.31, a screw connection or differently designed snap-in connection with suitable snap-in elements and counter-snap-in elements is ^[also] possible.

For providing the electrical contact of the adapter 1 and the device 8 connected with it with the busbars 4, multiple contact strip-like contact elements 1.4, which are insulated against each other, are embedded in the underside of the receiving bridge 1.1 and have ^{both} on the one hand, contact sections for contact with the top of the associated busbars 4 and ^{or near} on the other hand, make a transition to the connecting receiver 1.7 by means of a connecting section 1.6. The contact element 1.4 is additionally charged with the spring force from a pressure spring 1.5 in the area of the contact section, for example, for aiding the electrical contact. Connecting sections 1.6 can be formed in both, or only one of the two end sections of the adapter 1, the contact elements 1.4 are accordingly connected with the connecting sections 1.6. ^{With} By means of the elastic seating of the contact elements 1.4, an assured contact is also achieved ^{if} in case the tops of the busbars 4 ^{do} should not lie exactly on one level. ^{I +} Furthermore, it is possible to assure by means of the contact pressure that the adapter 1 is fixed in place, free of play, on the holding segments 2.21, 2.31. But fixation in place free of play can also be assured by supporting the underside of the bridge on the top of the busbars 4, so that the adapter 1 has a certain amount of elasticity, in particular in the receiving bridge 1.1. In another embodiment a stable, free-of-play connection of the adapter 1 with the mounting unit 2, along with an assured contact with the contact elements 1.4, can for example be provided by support elements on the top of the mounting unit 2, wherein the fixation in place takes place by means of appropriate snap-in elements extending below the holding section, or by means of screw connections. In all cases, the manipulation ^{while} in the course of attaching and removing the adapter 1 is simple, wherein electrical contact always takes place dependably during the execution of the mechanical fastening.

In areas in which the busbars 4 are not covered by adapters 1, cover elements can be attached to the holding sections 2.21, 2.31 of the mounting unit 2 with corresponding holding elements 1.21, 1.31, or similar holding elements, such as the adapters 1.